Perturbation Theory of the Tension Medium — Part II: The First Assault on V(d)

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Abstract. Part I identified the medium as a cloud of radial fall lines and reduced the fate of the acoustic peaks to one function: V(d), the sideways force between two neighboring lines. This note computes it by the two routes presently computable and maps the third. Route B (gravity, exact): the deep medium's active mass vanishes identically — the tension cancels the weight, the cosmic-string theorem — so smooth parallel fall lines exert no mutual force whatsoever. Route C (wave-laden lines): wiggles would make lines attract, but the same single-booking commitment that saved the energy budget switches this off — and in doing so acquires its sharpest form yet: *at depth, temperature is the period of the medium's state, not a stored energy* — a form audited here against every existing measurement and found untested rather than contradicted. Verdict of the assault: within all machinery this framework currently owns, V(d) = 0; the bundle is silent; the drum does not sound. Both zeros are load-bearing (they are the medium's stability and the budget's consistency), one computable door remains (the frame field's own non-abelian self-coupling — Part III), and the table of active mass yielded an unplanned curiosity: the medium's lateral gravity is nonzero precisely in the band $z \approx 1$–20, peaking near $z \approx 6$ — the observed epoch of structure formation. Every symbol introduced before use.

1. Route B: Gravity Between Fall Lines — Exact, and Zero

How hard does a medium pull sideways? Not by its energy density alone: in relativity, pressures pull too, and tensions anti-pull. The lateral pull is set by the *active* (Tolman) mass, $\rho_{active} = \rho + p_r + p_\theta + p_\varphi$. For the deep medium's signature $(\rho, -\rho, 0, 0)$ this is $\rho - \rho + 0 + 0$ = **zero, identically** — the celebrated property of cosmic strings (Vilenkin): a straight string bends space (a deficit angle) but *attracts nothing*. Two smooth parallel fall lines therefore feel no gravitational force at any separation: $V_{grav}(d) = 0$, exact. This zero is not a disappointment to be engineered away — it is *why* the medium is stable, dark, and smooth; the constitution's virtues and its silence are the same fact.

Computed across all depths from the exact tensor, the active mass tells a three-act story: **negative** near the observer ($-0.28\,\rho$ at $kr = 0.3$ — the non-collapsing core, booked since the Four Calculations note), **zero** in the deep (the string limit), and — the unplanned finding — **positive in between**, rising to $+0.30\,\rho$ around $kr \approx 2$, i.e. $z \approx 6$, nonzero through $z \approx 1$–20. The medium pulls sideways only in a middle band — and that band is, observationally, exactly the epoch where the universe's structure and star formation peak ("cosmic noon," $z \approx 2$–6). Recorded at the series' quarantine standard: either the medium's

active-mass window is why structure lives where it lives, or the coincidence will die in public.

2. Route C: Wave-Laden Lines, and the Commitment's Sharpest Form

A string carrying transverse waves gains active mass (wiggles weigh without tensing): wavy lines *attract*, in proportion to their wave-energy fraction. If the bath's naive aT^4 were stored as string-wave energy, that fraction at the wall would be the old 10^4 — and the budget catastrophe would return through the side door as a clumping catastrophe. Consistency therefore forces the single-booking commitment into its sharpest form: **at depth, temperature is the KMS period of the medium's state — the size of its W-circle — not a stored energy density.** Audited against everything measured: FIRAS measures the spectrum *arriving here* (intact); the T(z) law is measured through excitation temperatures, which are periods (intact); no experiment anywhere measures remote energy density directly. Untested, not contradicted — and it switches thermal clumping off: V_wiggle(d) ≈ 0 by the same principle that balanced the books. One principle, two rescues; that is either deep consistency or a single point of failure, and the note says both aloud.

3. Route A: the Engine — Mapped, Not Yet Computable

The entropic force between two lines is the ledger line $\delta Q = T \cdot dS$ priced on the strip of seal between them. It awaits the fiber pixel rule of the Allgemeine Feldtheorie's Section 11 — the same missing piece that guards α. One lock, two treasures behind it.

4. Verdict, and Part III

Within all machinery this framework currently owns, **V(d) = 0: the bundle is silent, and the drum does not sound.** Three campaigns have now asked the sky's question of three different mechanisms — cavity resonance, marginal patterns, bundle rigidity — and the framework has answered no three times, each time for a reason that doubles as one of its own virtues. What remains is the one interaction not yet computed because it is not gravitational at all: the fall lines are threads of the quaternion frame field, and that field self-couples — the non-abelian sector of the frame equations, the same term that makes gravity gravitate and colour confine. Part III must evaluate that self-coupling for two parallel threads. It is the last computable door; behind it is either the drum, at last — or the honest end of the static model's claim on the peaks, delivered by its own field equations.

References

A. Vilenkin, Phys. Rev. D 23, 852 (1981) — strings do not attract; P. S. Letelier (1979); R. C. Tolman (1934) — active mass; and the documents of this series (Part I; the campaign chronicle; the Allgemeine Feldtheorie, caveat (xi) and §11; script: vofd.py). *(Citations from memory; the literature-verification pass applies.)*